REPORT

OF THE

BOMBAY BACTERIOLOGICAL LABORATORY

FOR THE YEAR 1920

BY

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BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS
1922

[Price—3 annas]

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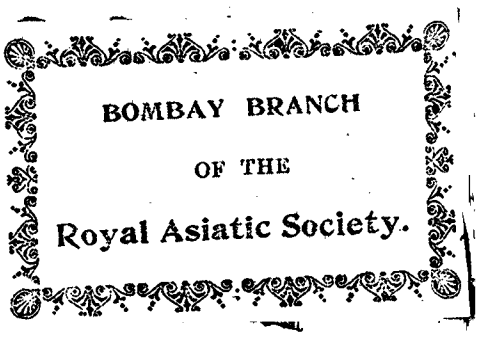

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REPORT OF THE BOMBAY BACTERIOLOGICAL LABORATORY. FOR THE YEAR 1920.

Staff.

Staff.

1. This report deals with the work carried out at the Laboratory during the year 1920: Lieutenant-Colonel W. Glen Liston, C.I.E., M.D., D.P.H., I. M. S., was Director of the Laboratory from 1st January to 4th December 1920, when he proceeded on one year's furlough, Major E. C. Hodgson, D.S.O., D.P.H., D.T.M. & H. (Camb.), I. M. S., officiated as Director from 5th to 31st December 1920.

The Director was assisted by the following officers :—

(1) Dr. D. A. Turkhud, M.B., C.M. (Edin.). He proceeded on privilege leave and deputation to England from 14th April to 1st December 1920. Major J. C. G. Kunhardt, I. M. S., acted for him.

(2) Dr. S. N. Gore, L.M. & S.

(3) Dr. M. B. Soparkar, M.D. (Bombay).

Arrangement of the Report.

Arrangement of the Report.

2. The report has been divided as usual into two parts dealing with the work done under separate heads.

(*i*) The Laboratory where all the anti-plague vaccine used in India and its dependencies is made, and where investigations connected with plague are carried out, and

(*ii*) The Bombay Bacteriological Laboratory where work connected with preventive medicine and pathological diagnosis for the whole of the Bombay Presidency is carried out.

PART I.

Work connected with Plague.

(*a*) Routine Work.

Manufacture and distribution of the Plague Prophylactic.

Output in doses of anti-plague vaccine for the past five years.

3. The table below gives comparative figures of out-put, in doses of anti-plague vaccine for the past five years. In these figures the dose of the vaccine is reckoned as 4 c.c. but when used within three months of the date of manufacture, a dose of only 3 c.c. is recommended :—

1916.	1917.	1918.	1919.	1920.
1,404,003	1,821,661	1,543,099	1,011,175	1,468,729

From the opening of the Laboratory in 1896 up to the end of the year, 20,318,870 doses of the vaccine have been sent out.

Distribution of anti-plague vaccine.

The distribution of anti-plague vaccine in India and Foreign Countries during the last two years is shown below :—

(Figures represent the number of doses.)

Place or Province.	1919.	1920.
Bombay Presidency and Sind	85,265	106,017
Madras Presidency	*66,025*	*213,700*
Bengal, Bihar and Assam	*9,270*	*4,635*
United Provinces of Agra and Oudh	45,480	*83,385*
The Punjab	*74,160*	*40,241*
North-Western Frontier Province	*6,320*	*14,258*
Central Province and Berar	*67,840*	*49,739*
Burma	*65,250*	*109,160*
Native States in India	*144,845*	*237,527*
Countries outside India	*446,300*	*610,067*
Portuguese Territory in India	*420*	....
Total number of doses	1,011,175	1,468,729

The following table shows the number of doses of anti-plague vaccine despatched monthly during the past two years :—

Month	1919.	1920.
January	54,790	95,280
February	80,615	132,940
March	107,630	45,325
April	77,355	44,035
May	118,805	80,440
June	13,315	33,365
July	9,730	90,000
August	38,490	118,245
September	74,095	107,990
October	177,210	240,337
November	99,830	361,054
December	159,310	119,718
Total ..	1,011,175	1,468,729

Statistics of Inoculation.

4. The following letter from the Chief Sanitation Officer of the British East Africa Protectorate, Nairobi, unfortunately does not show many reliable statistics as regards the anti-plague vaccine issued from this Laboratory but it does show the immediate great confidence of people who are in danger from plague in the prophylactic value of the vaccine :—

" Though a large number of anti-plague vaccinations were carried out during 1920 few statistics are available from which any deductions can be drawn as to the immunising power of the vaccine.

The Medical Officer of Health, Kisumu, supplies following figures :—

	Total cases.	Inoculated.	Not inoculated.	Deaths amongst inoculated.	Percentage.	Deaths amongst not inoculated.	Percentage.
Bubonic ..	22	13	9	4	30·7%	7	77·7%
Pneumonic..	19	5	14	3	60 %	14	100 %

The Medical Officer of Health, Mombasa, gives figures relating to the outbreak in that town which are attached. With regard to these figures we make the following observations :—

(1) The population of the town is estimated at about 30,000.

(2) There was no abnormal exodus from the town saving perhaps about 100 or 150 Indians.

(3) The total number of inoculations performed was 43,048 from this number must, however, be deducted about 9,000 inoculations performed from day to day on deck passengers arriving in the port as most of these people proceeded up country more or less immediately. A further 2,000 must be deducted also for secondary inoculations.

(4) No monetary rewards were given.

(5) Of 774 contacts who were isolated, all were inoculated at once and only two developed plague.

(6) There was no difficulty in getting the population to submit to inoculation.

(7) There is no sufficient record as to whether infected persons were inoculated or not. Most cases were notified after death or when so ill that no information could be elicited.

(8) *Re* ill effects : the various batches of vaccine varied in toxic effect, some produced no effect save a slight toxic reaction, others produced malaise and a temperature of 102 F. No other ill effects were experienced. (This has been our experience throughout the country.)

The Medical Officer in charge of North Kavirondo—a large native reserve where plague was severe and where many thousands of inoculations were performed is unable owing to local conditions to give any figures which could be of service but states that the native population soon acquired the greatest confidence in the prophylactic and that native chiefs, in many instances, sent to him desiring that their native people might be inoculated.

Weekly return of cases of plague and inoculations performed at Mombasa during 1920. The epidemic (save for two cases in 1919) and prophylactic inoculations were confined to that year. Estimated population 30,000.

PLAGUE IN MOMBASA—1920.

Weekly ending	Weekly No. of cases.	Weekly No. of inoculations.
24th January 1920	2	48
31st January 1920	2	32
7th February 1920	6	890
14th February 1920	5	2,118
21st February 1920	3	1,607
28th February 1920	0	1,232
6th March 1920	6	1,199
13th March 1920	0	953
20th March 1920	0	554
27th March 1920	2	875
3rd April 1920	0	784
10th April 1920	0	23
17th April 1920	0	10
24th April 1920	2	3
1st May 1920	4	58
8th May 1920	10	567
15th May 1920	10	1,680
22nd May 1920	12	784
29th May 1920	9	1,014
5th June 1920	22	1,050
12th June 1920	12	771
19th June 1920	8	587
26th June 1920	15	598
3rd July 1920	19	799
10th July 1920	15	1,720
17th July 1920	14	1,629
24th July 1920	8	1,888
31st July 1920	8	931
7th August 1920	9	960
14th August 1920	9	1,062
21st August 1920	21	804
28th August 1920	24	1,007
4th September 1920	28	1,327
11th September 1920	22	1,323
18th September 1920	31	1 484
25th September 1920	15	863
2nd October 1920	20	1,015
9th October 1920	7	1,550
16th October 1920	12	607
23rd October 1920	5	1,114
30th October 1920	6	1,370
6th November 1920	1	1,632
13th November 1920	0	1,659
20th November 1920	0	851
27th November 1920	0	6
4th December 1920	0	0
11th December 1920	0	0
18th December 1920	1	12
Total	408	43,048

All persons leaving this island by ferries were inoculated during and after this week. The majority of these persons entered the island from the mainland the same day.

All persons leaving the Island by train had to produce inoculation certificate not more than 3 months old."

(*b*) Research.

5. No important research in connection with plague was undertaken during the year but observations on the habits of rats especially in connection with shipping in the Port of Bombay was commenced in December by Assistant Surgeon G. D. Chitre.

(*c*) Assistance and advice rendered.

6. The health Department of the City of Bombay continued to send to this Laboratory rats found dead or caught alive within the Municipal limits. With each rat a note was received indicating where it had been caught or found, so that after examination it was possible to inform the Health Officer where plague-infected specimens had been caught or picked up. The Health Officer was thus able to know definitely from day to day the progress of the disease among rats in the different parts of the city.

Examination of rats for plague.

During the year 1920, six hundred and ninty-three thousand and seventy-eight rats were received at the Laboratory. Of this number two hundred and forty thousand and thirty-one were alive when received, and four hundred and fifty-three thousand and forty-seven were dead. Of the latter three hundred and thirty-four thousand nine hundred and forty-six were examined and among them four thousand eight hundred and fifteen were found to be plague-infected.

The following table shows the progress of plague among men and rats in Bombay City during each half month of the year 1920. The figures which refer to human mortality record the number of deaths from plague each half month. The figures showing the progress of the desease in rats are given separately for *Mus rattus* and *Mus decumanus*. These figures have been calculated from the number of rats found infected at the examination made at the Laboratory on every day of the week except Sundays and Holidays; from the actual figures thus obtained a figure has been calculated for all the days of each half month and these are the figures recorded below:—

Return of rats examined during the year 1920.

	Human Plague mortality.		Plague-infected Mus rattus.		Plague-infected Mus decumanus.	
	Number of deaths from plague.	Percentage above or below mean for the year.	Figures calculated from each half month.	Percentage above or below mean for the year.	Figures calculated for each half month.	Percentage above or below mean for the year.
1st to 15th January 1920	0	−100	12·5	−50	102·5	−53
16th to 31st „ „	3	−70	12·6	−50	156·6	−28
1st to 15th February „	9	−10	31·2	+24	207·5	−5
16th to 29th „ „	13	+30	34·4	+37	291·5	+34
1st to 15th March „	11	+10	40·0	+59	372·5	+71
16th to 31st „ „	15	+50	42·3	+69	451·4	+112
1st to 15th April „	29	+190	66·2	+164	567·5	+160
16th to 30th „ „	37	+470	48·5	+93	438·5	+101
1st to 15th May „	20	+100	34·6	+38	409·6	+88
16th to 31st „ „	16	+60	44·0	+75	372·0	+71
1st to 15th June „	9	−10	15·0	−40	235·0	+8
16th to 30th „ „	13	+30	30·0	+20	196·2	−10
1st to 15th July „	10	−0	26·5	+6	210·0	−4
16th to 31st „ „	14	+40	35·4	+41	211·4	−3
1st to 15th August „	19	+90	20·0	−20	202·5	−7
16th to 31st „ „	11	+10	13·7	−45	98·3	−55
1st to 15th September „	9	−10	20·0	−20	130·0	−40
16th to 30th „ „	0	−100	16·4	−35	137·7	−37
1st to 15th October „	3	−70	13·8	−45	96·9	−56
16th to 31st „ „	1	−90	10·3	−59	69·7	−68
1st to 15th November „	0	−100	8·7	−65	46·0	−79
16th to 30th „ „	0	−100	7·5	−70	58·7	−73
1st to 15th December „	4	−60	6·9	−73	62·3	−71
16th to 31st „ „	2	−80	12·3	−51	107·1	−51
Total ..	248	....	....	....	....	....

(*d*) Educational Work.

7. (1) During the year 6 medical men and one medical lady under-went a course of Practical training in Bacteriology at the Laboratory.

(2) A Sub-Assistant Surgeon from Ichalkaranji State attended the Laboratory for a course of instructions in the technique of inoculation.

(3) The Deputy Health Officer of Secunderabad under-went a special course of instructions for 6 weeks in connection with Malaria and prevention of that disease.

PART II.

Work of the Laboratory as the Provincial Bacteriological Laboratory.

(*a*) Routine Work.

I.—Examination of pathological fluids and discharges, water, food-stuffs, etc.

Examination of Pathological fluids and discharges, water and food stuffs.

8. (1)	Blood sera for agglutination for typhoid, paratyphoid and Malta fevers, etc. ..	117	Specimens.
(2)	Blood for Wassermann reaction..	1,482	
(3)	Blood smears examined .. .. 83 Blood counts made 1	84	,,
(4)	Sputa for B. tuberculosis or other organisms ..	91	,,
(5)	Throat swabs for B. diphtheria, meningococcus, pneumococcus, etc.	322	,,
(6)	Urine and fæces.—		
	Urine for general examination, tuberculosis, cholera, Bilharziosis, etc.	68	,,
(7)	Fæces for cholera, dysentery, typhoid, etc. ..	125	,,
(8)	Smears of pus for gonococci, meningococci, etc. ..	34	,,
(9)	Fluids and discharges	32	,,
(10)	Cultures of organisms for identification	21	,,
(11)	Smears from rats for the presence of bacillus pestis ..	48	,,
(12)	Specimens examined for the presence of leprosy bacilli ..	12	,,
(13)	Milk-samples	18	,,
(14)	Water.—		
	Chemical examination .. 168 Bacteriological examination .. 53	221	,,
(15)	Food stuffs examined or analysed	10	,,
(16)	Miscellaneous examinations of barium carbonate, neokharsivan, oil, chloroform, earth, arsenobillon, novarsenobillon, air, "sterlogen," beer, cotton, sodium hydro-sulphite, tallow, boiler scale, sodium morrhuates, Giemsa solution, sodium taurocholate ..	37	,,
(17)	Brushes examined for anthrax	78	,,
(18)	Articles tested for sterility	20	,,
(19)	Disinfectants tested	2	,,
(20)	Post-mortem examinations carried out on animals received from the Victoria Gardens	16	,,
(21)	Mosquitoes, worms, snakes, for identifications ..	19	,,

II.—Pathological tissues for diagnosis.

Classification of morbid tissues sent for examination.

9. I.—Tumours.—

A.—Non-malignant.

Fibroma	
Fibro-adenoma	5
Fibro-cystic adenoma	2
Fibro-angioma	2
Soft fibroma	1
Myxo-fibroma	1
Fibro-lipoma	1
Fibro-myoma	1
Lymph-adenoma	1
Angioma	1
Chondroma	1
Cavernous lymphangioma	2
Papilloma	1
Teratoma	
	28

B.—Malignant.

Carcinoma	9
Glandular-carcinoma	2
Scirrhus-carcinoma	3
Adeno-carcinoma	2
Melanotic-carcinoma	2
Secondary-carcinoma	1
Epithelioma	9
Endothelioma	1
Rodent Ulcer	2
Spindle-cell sarcoma	6
Degenerated sarcoma	1
Myeloid-sarcoma	1
Myxo-sarcoma	1
Round-cell sarcoma	2
Polymorphic- ell sarcoma	1
Lympho-sarcoma	1
Melanotic-sarcoma	1
Fibro-sarcoma	1
	46

II. Granulomata.—

Syphilitic	1
Tubercular	10
Other Granulomata	1
	12

III. Other pathological conditions.—

Cirrhosis of the liver	1
Mycetoma	1
Endometritis	1
Red hepatisation (lung)	1
Pneumonic lung	3
Anthrax	10
Tissues found to be normal	1
Miscellaneous pathological conditions	69
	87

Total ... 173

III. Diagnosis of Rabies.

Examination of dogs, etc., for rabies.

10. The following is the statement of the examination of brains of dogs and other animals for the diagnosis of rabies during the year 1920 :—

Bombay :—

Through the Bombay Veterinary College	57
Through the Bombay Police	21
Through private owners	12
From other places in Bombay	6
Out stations	64
	160

The result of the examination of these animals was as follows :—

Received in a condition unfit for examination	8
No evidence of rabies	35
Suspicious although no definite Negri bodies found	6
Negri bodies found, brains obtained from rabid animals ..	111
	160

IV. The preparation of vaccines.

Vaccines.

11. In addition to the plague vaccine, details of which are recorded elsewhere the following vaccines were prepared at the Laboratory and supplied both to military and other bodies in and out of India :—

Autogenous vaccines prepared for 57 cases.

Stock vaccines :—

Staphylococcus	90 c.cs.
Streptococcus	32 c.cs.
Gonococcus	Nil
Acne	24 c.cs.
Tuberculin	77 c.cs.
Pneumococcus	14 c.cs.
Anti-cholera	19,737 c.cs.
Mixed T. A. B.	7,248 c.cs.
Leprosy	3,350 c.cs.
Influenza	40,458 c.cs.
Typhoid Dead Emulsion	46 c.cs.

V. Snakes and anti-venine.

12. The following poisonous snakes were received alive at the Laboratory :—

Place.	Cobras.	Russell's vipers.	Krait.	Echis.
Bharatpur	5	..	..	..
Ranebennur	2	..	..	..
Narsingpur	3	..	..	..
Bombay	6	12	..	..
Total ..	16	12	..	..

Total number of snakes received alive 28

Snakes.

Venom was collected periodically from the cobras and Russell's Vipers. It was dried and sent to the Central Research Institute, Kasauli, where the anti-venine is prepared.

(*b*) Research Work.

13. (1) Dr. S. N. Gore studied in association with Captain R. H. Malone, I.M.S., the numerous tests recommended for the detection of indole in bacterial cultures. As a result of this investigation it was found that the only reliable specific test was that suggested by Dr. Gore and adopted as a routine test when making observations on the production of indole by Pfeiffer's bacillus. In addition to it being a very simple test it is very delicate and specific for indole. It has been called the cotton wool plug test, because the test is performed in the cotton wool plug of the culture tube. In brief, this test consists in moistening the under surface of the cotton wool plug with a few drops of Bohme's solutions, and heating the culture tube for a few minutes. In the case of a positive result, a rose colour appears on the under surface of the plug. This test may be performed with agar as well as with broth cultures.

(2) Dr. Gore also developed in association with Captain Malone a quantitative method for estimating indole colorimetrically. Indole is first extracted from bacterial culture by means of chloroform, and colour effected therein by means of Bohme's solution No. 1, *i. e.* the one containing paradimethylamidobenzaldehyde, and compared with a series of tubes containing graded quantities of indole dissolved in chloroform and in which the colour is produced by adding Bohme's solution.

(3) Dr. Gore and Captain Malone from a series of experiments performed with B. coli communis found that in a broth culture the maximum growth is attained in 24 hours, corresponding with the maximum quantity of indole produced in the culture. It was only in a few cases that there was a slight increase in the quantity of indole later. This finding is contrary to what other workers have found, *viz.*, that indole goes on progressively increasing for over a week. A detailed description of the cotton wool plug test for indole, and criticism of the several methods for detecting indole have been published in the Indian journal of Medical Research, Vol. VIII, No. 3, January, 1921.

Schistosomiasis.

(4) Investigations in connection with Schistosomiasis were continued by Dr. Soparkar. A visit was paid to Erinpura in Rajputana with a view to discovering the cercaria of *Sch. indicum* Specimens of molluscs were also collected from Palanpur, Ahmedabad and other places in Gujarat but no schistosome larva has so far been discovered in them except in one specimen from Ahmedabad in which cercariae resembling that o Sch. spindalis were found as a mixed infection.

Medium for growing B. influenzæ.

(5) Experiments were made in connection with the medium devised by Dr. Soparkar for the cultivation of the influenza bacillus, to test the keeping quantities of the blood extract used in its preparation. He has found that the blood extract when preserved in an aseptic condition in the cold retains its properties for several months so that the influenza bacillus grows as luxuriantly on media prepared with the preserved extract as on those prepared with the fresh extract. The experiments are being continued. The observation has a practical value in so far as the medium should therefore be able to be prepared even by the general practitioner without the facilities of a laboratory, in small quantities at short notice.

(*c*) Assistance and Advice Rendered.

HCN gas fumigation.

14. Assistance in disinfection by Hydrocyanic acid gas was rendered to the Officer Commanding Colaba War Hospital in the destruction of bugs, etc. The wards Nos. 1, 2 and 6 on the ground floor and wards Nos. 7, 8, 9, 10, and 11 on the first floor as well as the Offices attached to the wards on each floor of the Colaba War Hospital were fumigated with HCN gas. Dead bugs were found in several places and a search for live ones proved negative.

(*d*) Educational.

15. Special demonstrations were arranged for the students of Poona Agricultural College, Secondary Training College, Training College for Men, Poona. B. E. S. Girl's High School, Seva Sadan College, Poona, Aryan E. Society's High School, Gokuldas Tejpal Seminary, Government High School, Nadiad and other institutions.

Facilities were given to Dr. Alberts Germano da Silva Correa, Captain and Professor of the Medical College in Portuguese India to see the work of the Laboratory and Professor Geddes and his students were shown some demonstrations.

A number of sets of Magic Lantern Slides on Plague, Tuberculosis and Guinea-worm disease were prepared at the Laboratory and issued to the District Sanitary Association, Belgaum, the Sanitary Commissioner, Madras, District Health Association, Trichinopoly and to the Officer in charge Visual Instruction, Bombay.

A set of slides on snakes was given on loan to the Sanitary Commissioner, Bengal that on Flies was supplied on loan to Major Cragg at Kasauli. Also sets of slides on different subjects were issued on loan to the Civil Surgeons, Muzaffarpur, Belgaum and to the Bombay Municipality for an "Exhibition Show."

E. C. HODGSON, Major, I. M. S.,
Officiating Director,
Bombay Bacteriological Laboratory.

Bombay Bacteriological Laboratory, Parel,
Bombay, 17th September 1921.

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